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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: JACQUES BEAUVIR

FOR: OXIDISING ELECTROLYTIC METHOD FOR OBTAINING A CERAMIC COATING
AT THE SURFACE OF A METAL

PRELIMINARY AMENDMENT

Box Patent Application
The Assistant Commissioner of
Patents and Trademarks
Washington, DC 02031

Sir:

Prior to the Examiner acting in the above-referenced application, please preliminary amend the specification, claims and abstract as follows:

IN THE SPECIFICATION:

Please insert the following title at the top of page one:

-- OXIDISING ELECTROLYTIC METHOD FOR OBTAINING A CERAMIC COATING AT
THE SURFACE OF A METAL --.

Please insert the following section heading before the first paragraph on the first page:

-- TECHNICAL FIELD--.

Please insert the following section heading between the first and second paragraphs on the first page:

--BACKGROUND OF THE INVENTION--.

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Jennifer Matson

(Typed or printed name of person mailing paper or fee)

Signature of person mailing paper or fee

Please replace the third paragraph on page six with the following rewritten version:

-- SUMMARY OF THE INVENTION

An electrolyte process is provided for plasma microarc oxidation for the purpose of obtaining a ceramic coating on the surface of a metal workpiece having semiconducting properties, such as aluminium, titanium, magnesium, hafnium, zirconium and their alloys by a physico-chemical transformation reaction of the treated metal. The porosity of the ceramic layer is decreased, obtaining a very dense and uniformly thick layer over the entire surface of the workpiece. Furthermore, the time to grow the ceramic on the surface of the metal workpiece is reduced, while decreasing the electrical energy consumed. --

Please insert the following section heading after the fourth paragraph on the tenth page of the specification:

--BRIEF DESCRIPTION OF THE DRAWINGS--

Please insert the following section heading before the fifth paragraph on the eleventh page:

--DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT--

IN THE ABSTRACT:

Please rewrite the abstract as follows:

Process for obtaining a ceramic coating on the surface of a metal having semiconducting properties, such as aluminum, titanium, magnesium, hafnium, zirconium and their alloys, by a physico-chemical transformation reaction of the treated metal. This process consists in immersing the metal workpiece to be coated in an electrolytic bath composed of an aqueous solution of an alkali metal hydroxide, such as potassium hydroxide or sodium hydroxide, and of an oxyacid salt of an alkali metal, the metal workpiece forming one of the electrodes, and in applying a signal voltage of overall triangular waveform to the electrodes, that is to say a signal having at least a rising slope and a falling slope, with a form factor that can vary during the process, generating a current which is controlled in its intensity, its waveform and its ratio of positive current to negative current.

IN THE CLAIMS:

Please replace claims 1-12 with the following rewritten versions:

1. (Amended) Electrolytic process for plasma microarc oxidation for obtaining a ceramic coating on a surface of a metal having semiconducting properties by a physico-chemical transformation reaction of the treated metal, comprising:

immersing the metal in an electrolytic bath composed of an aqueous solution of an alkali metal hydroxide and an oxyacid salt of an alkali metal, the metal forming an electrode; and

applying a signal voltage of overall triangular waveform to the electrode, having at least a rising slope and a falling slope, with a form factor that can vary during the process, generating a current which is controlled in intensity, waveform and ratio of positive intensity to negative intensity.

2. (Amended) Process according to Claim 1, wherein the rising and falling slopes of the voltage signal are approximately symmetric.

3. (Amended) Process according to Claim 1, wherein the rising and falling slopes of the voltage signal are asymmetric and have angles which vary during the electrolysis.

4. (Amended) Process according to Claim 1, further comprising making the value of the triangular voltage change between 300 and 600 Vrms during the process.

5. (Amended) Process according to Claim 1 further comprising making the frequency of the triangular signal vary between 100 and 400 Hz during the process.

6. (Amended) Process according to Claim 1 further comprising making the value of the current vary or fixing it independently of the value of the voltage.

7. (Amended) Process according to Claim 1, further comprising varying the form factor, a value of a potential, a frequency and a value of a current, independently during the process.

8. (Amended) Process according to of Claim 1, further comprising varying the form factor, a value of a potential, a frequency, a value of a current and the UA/IC ration, simultaneously during the process.

9. (Amended) Process according to Claim 1, further comprising separately controlling the waveforms and electrical power values VI in a positive phase and/or in a negative phase.

10. (Amended) Electronic generator for implementing the process according to Claim 1 comprising:

a first unit for connection to a single-phase or three-phase electrical supply from mains and a second unit for connection to an electrolysis tank:

a module for converting a sinusoidal AC signal delivered by the mains into a trapezoidal or sawtooth signal;

a module for modifying a slope and a form factor of the signal;

a module for varying a frequency in various types of cycle; and

a module for managing electrical energy according to parameterized energy and energy used.

11. (Amended) Electric generator according to Claim 10, wherein the generator includes, at an output, an isolating transformer with series-connected capacitors in primary or secondary, in order to filter a DC component so as to prevent the magnetic circuit from saturating, while introducing optimum operating safety in respect of electrical protection, with connection of one of the poles to the earth.

12. (Amended) Electric generator according to Claim 10, wherein the generator is controlled by a PC-type processor used to manage the various parameters during the execution of the process.

Please insert the following newly added claims:

13. (Newly Added) Process according to claim 1, wherein the metal is selected from the group comprising aluminum, titanium, magnesium, hafnium, zirconium and alloys of the same.
14. (Newly Added) Process according to claim 1, wherein the aqueous solution is potassium hydroxide or sodium hydroxide.

REMARKS

Applicant requests entry of the present amendments which conform the claims to U.S. practice. No new matter is being introduced by this Amendment as antecedent support is set forth in the original specification and in the original claims.

Prosecution on the merits is respectfully requested.

The Examiner is invited to contact Applicant's Attorneys at the below-listed telephone number regarding this Preliminary Amendment or otherwise regarding the present application.

If there are any charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicant's attorneys.

Respectfully submitted,

JACQUES BEAUVIR

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The third paragraph on the sixth page is rewritten herein as follows:

“SUMMARY OF THE INVENTION

[It is an object of the invention to provide a] An electrolyte process is provided for plasma microarc oxidation for the purpose of obtaining a ceramic coating on the surface of a metal workpiece having semiconducting properties, such as aluminium, titanium, magnesium, hafnium, zirconium and their alloys by a physico-chemical transformation reaction of the treated metal. The [object is to decrease the] porosity of the ceramic layer is decreased, obtaining a very dense and uniformly thick layer over the entire surface of the workpiece. Furthermore, [it is an object of the invention to reduce] the time to grow the ceramic on the surface of the metal workpiece is reduced, while decreasing the electrical energy consumed.”

IN THE CLAIMS:

Claims 1-12 are rewritten herein as follows:

1. (Marked Up/Amended) Electrolytic process for plasma microarc oxidation for [the purpose of] obtaining a ceramic coating on [the] a surface of a metal having semiconducting properties[, such as aluminum, titanium, magnesium, hafnium, zirconium and their alloys,] by a physico-chemical transformation reaction of the treated metal, [characterized in that it consists in] comprising:

[-] immersing the metal [workpiece (5) to be coated] in an electrolytic bath [(3)] composed of an aqueous solution of an alkali metal hydroxide[, such as potassium hydroxide or sodium hydroxide,] and [of]an oxyacid salt of an alkali metal, the metal [workpiece] forming [one of the] an electrode[s]; and

[-] applying a signal voltage of overall triangular waveform to the electrode[s], [that is to say a signal]having at least a rising slope and a falling slope, with a form factor that can vary during the process, generating a current which is controlled in [its] intensity, [its] waveform and [its] ratio of positive intensity to negative intensity.

2. (Marked Up/Amended) Process according to Claim 1, [characterized in that] wherein the rising and falling slopes of the voltage signal are approximately symmetric.

3. (Marked Up/Amended) Process according to Claim 1, [characterized in that] wherein the rising and falling slopes of the voltage signal are asymmetric and have angles which vary during the electrolysis.

4. (Marked Up/Amended) Process according to [one of] Claim[s] 1 [to 3], [characterized in that it consists in] further comprising making the value of the triangular voltage change between 300 and 600 Vrms during the process.

5. (Marked Up/Amended) Process according to [one of] Claim[s] 1 [to 4], characterized in that it consists in] further comprising making the frequency of the triangular signal vary between 100 and 400 Hz during the process.

6. (Marked Up/Amended) Process according to [one of] Claim[s] 1 [to 5], characterized in that it consists in] further comprising making the value of the current vary or [to] fixing it independently of the value of the voltage.

7. (Marked Up/Amended) Process according to [the combination of] Claim[s] 1 [to 6], [characterized in that it consists in] further comprising varying [the various parameters, namely] the form factor, [the]a value of [the]a potential, [the]a frequency and [the]a value of [the]a current, independently during the process.

8. (Marked Up/Amended) Process according to [the combination] of Claim[s] 1 [to 6], [characterized in that it consists in] further comprising varying [at least some of the various parameters, namely] the form factor, [the]a value of [the]a potential, [the]a frequency, [the]a value of [the]a current and the UA/IC ration, simultaneously during the process.

9. (Marked Up/Amended) Process according to [one of] Claim[s] 1 [to 8], [characterized in that it consists in] further comprising separately controlling [its] the waveforms and [the] electrical power values VI in [the] a positive phase and/or in [the] a negative phase.

10. (Marked Up/Amended) Electronic generator [of the current source type] for implementing the process according to [one of] Claim[s] 1[to 9,] comprising:

a first unit [(9)] for connection to a single-phase or three-phase electrical supply from [the] mains and a second unit for connection to [the] an electrolysis tank[, characterized in that it comprises:]:

[-] a module [(10)] for converting [the] a sinusoidal AC signal delivered by the mains into a trapezoidal or sawtooth signal;

[-] a module [(12)] for modifying [the] a slope and [the] a form factor of the signal;

[-] a module [(13)] for varying [the] a frequency in various types of cycle; and

[-] a module [(14)] for managing [the] electrical energy according to [the] parameterized energy and [the] energy used.

11. (Marked Up/Amended) Electric [G]enerator according to Claim 10, [characterized in that] wherein the generator [it] includes, at [the] an output, an isolating transformer with series-connected capacitors in [the] primary or [the] secondary, in order to filter [the] a DC component so as to prevent the magnetic circuit from saturating, while introducing optimum operating safety in respect of electrical protection, with connection of one of the poles to the earth.

12. (Marked Up/Amended) Electric [G]enerator according to [either of] Claim[s] 10 [and 11], [characterized in that] wherein the generator [it] is controlled by a PC-type processor [(8)] used to manage the various parameters during the execution of the process.

IN THE ABSTRACT:

The abstract is rewritten herein as follows:

Process for obtaining a ceramic coating on the surface of a metal having semiconducting properties, such as aluminum, titanium, magnesium, hafnium, zirconium and their alloys, by a physico-chemical transformation reaction of the treated metal. This process consists in immersing the metal workpiece [(5)] to be coated in an electrolytic bath [(3)] composed of an aqueous solution of an alkali metal hydroxide, such as potassium hydroxide or sodium hydroxide, and of an oxyacid salt of an alkali metal, the metal workpiece forming one of the electrodes, and in applying a signal voltage of overall triangular waveform to the electrodes, that is to say a signal having at least a rising slope and a falling slope, with a form factor that can vary during the process, generating a current which is controlled in its intensity, its waveform and its ratio of positive current to negative current.

[Figure 1]